

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Kyung-geun LEE, et al.

Application No.: To be assigned

Group Art Unit: To be assigned

Filed: July 31, 2003

Examiner: To be assigned

For: INFORMATION STORAGE MEDIUM AND METHOD OF RECORDING AND/OR
REPRODUCING WITH RESPECT TO THE MEDIUM

**SUBMISSION OF ENGLISH TRANSLATION OF PRIOR PROVISIONAL
APPLICATION IN ACCORDANCE WITH 37 C.F.R. § 1.78**

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

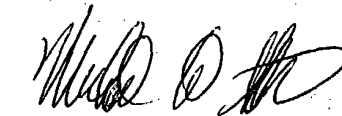
The applicants submit herewith an English translation of U.S. Provisional Application Serial No. 60/402,544 and a statement from the translator that the translation is accurate in compliance with 37 C.F.R. §1.78.

Date Respectfully submitted,

STAAS & HALSEY LLP

Dated: July 31, 2003
1201 New York Ave., N.W., Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500
Facsimile: (202) 434-1501

By:



Michael D. Stein
Registration No. 37,240

IN THE MATTER OF

U.S. Provisional Application No. 60/402,544

By Samsung Electronics Co., Ltd

I, Yang-hee Tak, an employee of Y.P.Lee & Associates of The Cheonghwa Bldg., 1571-18 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare that I am familiar with the Korean and English language and that I am the translator of U.S. Provisional Application and certify that the following is to the best of my knowledge and belief a true and correct translation.

Signed this 4th day of November 2002

A handwritten signature in black ink, reading "Yanghee Tak", written over a horizontal line.

ABSTRACT

[Abstract of the Disclosure]

Provided are an information storage medium and a recording/reproducing method therefor. The information storage medium includes an area in which disc- and recording-related information updated with a change in at least one of a disc version number and a recording speed is recorded along with existing disc- and recording-related information. In the method, existing disc- and recording-related information is recorded. Disc- and recording-related information updated with a change in at least one of a disc version number and a recording speed is recorded in an area in which the existing disc- and recording-related information is recorded. Accordingly, data can be recorded/reproduced on/from a new version of information storage medium even using an existing drive.

[Representative Drawing]

FIG. 3A

SPECIFICATION

[Title of the Invention]

Information storage medium and recording and/or reproducing method
therefor

[Brief Description of the Drawings]

FIG. 1 is a view of data structures in a lead-in area and a user data area of an information storage medium according to the present invention.

FIG. 2A is a view explaining an information storage medium and a recording and/or reproducing method therefor according to the present invention.

FIG. 2B is a view of an example of a recording pattern for recording information on the information storage medium according to the present invention.

FIG. 3A is a view of a structure of data recorded on an information storage medium according to a preferred embodiment of the present invention.

FIG. 3B is a view of another example of a recording pattern for recording information on the information storage medium according to the present invention.

FIG. 4 is a flowchart explaining a process of recording and/or reproducing information on and/or from the information storage medium according to the present invention.

[Detailed Description of the Invention]

[Object of the Invention]

[Technical field of the Invention and Related Art prior to the Invention]

The present invention relates to an information storage medium and a recording/reproducing method therefor, and more particularly, to an information storage medium on which updated information are recorded together with existing information as a version number or a speed of the recording/reproducing medium varies, and a recording/reproducing method therefor.

In general, optical information storage media, e.g., optical discs, are widely used as information media for optical pickup devices which record/reproduce information on/from the optical discs without contacting the optical discs. According to the information recording capacity, optical discs can be classified into compact discs (CDs) and digital versatile discs (DVDs). CD-Rs, CD-RWs, DVD-RWs, DVD-RAMs, DVD+RWs, etc., are optical discs on and from which data can be recorded, erased, and reproduced.

Meanwhile, as the recoding speed of the optical discs has increased and disc versions are updated, disc-related information, recording-related information, etc., have to be provided to disc drives. In particular, even though the recording speed has increased and disc versions are updated, it is helpful for a user that a new disc is compatible with an existing drive so as to record/reproduce data on/from the new disc. Also, when setting a disc format, it is preferable to determine parameters of recording-related information so as to be consistent with an existing disc format.

Reliable recording will be performed only when the disc drive operates so as to satisfy recording characteristics suitable for the recording speed of the optical discs. However, due to an increase in the recording speed of the disc drive and the optical disc, new standards for the disc drive and the optical disc are established, and new discs are manufactured to be suitable with the new standards. Also, contents related to the recording characteristics, such as recording speed, recording method, or the like, are modified accordingly in the updated standards.

Accordingly, in order to properly record information on an updated disc using an existing drive, updated disc version-related information, recording-related information, or the like have to be read by the existing drive. However, since future disc version numbers, recording methods, or the like cannot be predicted at all, it is impossible to manufacture drives which are capable of covering the entire range of recoding speed and version information of future optical discs. Thus, new updated optical disc on/from which data can be recorded/reproduced using the existing drive and a recording/reproducing method therefor are required.

[Technical goal of the Invention]

To solve the above-described problems, it is an object of the present invention to provide an information storage medium from which parameters of disc-related information and recording-related information that change with the recording speed or disc version can be recognized by an existing drive to be recorded/reproduced by the existing drive, and a recording/reproducing method therefor.

[Structure of the Invention]

Accordingly, to achieve the above object, there is provided an information storage medium including an area in which disc- and recording-related information updated with a change in at least one of a disc version number and a recording speed is recorded along with existing disc- and recording-related information.

It is preferable that the disc- and recording-related information updated with a change in at least one of the disc version number and the recording speed is recorded in the same format as existing disc- and recording-related information.

The updated disc- and recording-related information may be successively recorded right after the existing disc- and recording-related information.

A portion of the updated disc- and recording-related information may be recorded in the same format as the existing disc- and recording-related information while the number of bytes required for recording the portion of the updated disc- and recording-related information are different from the existing disc- and recording-related information.

Data recorded in a byte number different from existing information may be a parameter related to a new recording pattern, and the new recording pattern may include parameters of an existing recording pattern.

To achieve the above object, there is provided a method of recording/reproducing information on/from an information storage medium. Existing disc- and recording-related information is recorded. Disc- and recording-related information updated with a change in at least one of a disc version number and a recording speed is recorded in an area in which the existing disc- and recording-related information is recorded.

The disc- and recording-related information may be recorded by a push-pull signal channel or a sum channel.

Hereinafter, an information storage medium and a recording/reproducing method therefor according to preferred embodiments of the present invention will now be described in detail with reference to the attached drawings.

FIG. 1 shows data structures in a lead-in area 10 and a data area 15 in which user data is recorded in an information storage medium. A lead-out area has a data structure similar to the data structure in the lead-in area 10, and thus its detailed descriptions will be omitted.

For example, the lead-in area 10 may have a disc test zone 10-1, a drive test zone 10-2, a defect management zone 10-3, a disc control data zone 10-5, and a buffer zone 10-6. Also, the lead-in area 10 may further include a reserved zone 104 in which other information can be recorded.

When a recording speed is changed to improve a data transfer rate of the information storage medium, a version number and a writing strategy used for

recording are also changed. However, in an existing drive, a new disc version number cannot be recognized and the recording speed is determined. In this situation, it is preferable that updated disc- and recording-related information is provided together with existing disc- and recording-related information so that a new version of disc can be used in existing and new drives.

For example, FIG. 2A shows recorded disc- and recording-related information corresponding to a disc version 1.0. The disc- and recording-related information is recorded in a groove wobble format when mastering the disc. Before or after recording user data, the disc- and recording-related information recorded in the groove wobble is copied and transferred to recordable zones in at least one of the lead-in area 10 and the lead-out area. Here, information recorded in the lead-in area 10 or the lead-out is identical to information recorded in the groove wobble. Also, information recorded in the lead-in area 10 or the lead-out area requires the same number of bytes as the information recorded in the groove wobble. In addition, information recorded in the lead-in area 10 or the lead-out area is recorded in the same format as the information recorded in the groove wobble. The groove wobble may be formed in the user data area 15. Also, the disc- and recording-related information may be recorded in the disc control data zone 10-5 in the lead-in area 10.

A portion of the information recorded in the wobble format may be different from a portion of the information recorded in the lead-in area 10 or the lead-out area. For example, when writing an address of a user data area, the maximum address of the user data area may be recorded in the groove wobble, and an address of an area in which recording of user data is substantially finished may be recorded in a lead-in area or a lead-out area. In this case, a portion of data recorded in the groove wobble may be different from a portion of data recorded in the lead-in area or the lead-out area.

The disc-related information may be information on the disc kind, disc version number, disc size, disc structure, disc manufacturer, or the like. Also, the recording-related information may be information on the recording speed, reproduction power, and recording pattern information including Ttop, Tmp, and Tcl. FIG. 2B shows an example of a recording pattern corresponding to the disc version 1.0. Here, Ttop, Tmp, and Tcl denote a start pulse time, a multi-pulse time, and a cooling pulse time, respectively. Also, Pw, Pe, and Pb denote a recording power,

an erase power, and a bias power, respectively, and T in $7T$ and $3T$ denotes the minimum length of a recording mark. Information on the number of bytes used for recording the recording-related information is also recorded. With reference to this information, only necessary data can be selectively reproduced from recording-related data. In FIG. 2A, the disc-related information is recorded in 0 - 3 bytes and the recording-related information is recorded in 4 - 9 bytes. Also, 10 to M bytes may be left as a reserved area. Here, M is larger than 10.

The disc- or recording-related information is revised with a change of one of the version number and the recording speed. Here, it is preferable that the revised disc- or recording-related information is successively recorded after the existing disc- or recording-related information. Referring to FIG. 3A, the disc- and recording-related information corresponding to an existing disc version, i.e., the disc version 1.0, is recorded in 0 - 10 bytes and disc- or recording-related information on a new disc version or a new disc recording speed is recorded in 11 - M bytes. The new disc- or recording-related information is recorded in the same format as the existing disc- and recording-related information so as to be consistent with the existing format. However, the number of bytes used for recording disc- and recording-related information may vary.

For example, the difference between a recording pattern, corresponding to a disc version 2.0 shown in FIG. 3B, and the recording pattern, corresponding to the disc version 1.0 shown in FIG. 2B, is as follows. Parameters such as T_{top} , T_{mp} , and T_{cl} are identical, but erase powers P_{e2} and P_{e1} are different, which results in the addition of a parameter $Temp$ to an erase pattern. In this case, it is preferable that disc- and recording-related information on the new disc version is recorded in 11 - M bytes after the 0 - 10 bytes in which disc- and recording-related information on the existing disc version 1.0 is recorded, in the same format as for the existing disc version 1.0. In other words, the order of recording information on the new disc version is the same as the order of recording information on the existing disc version. However, as previously described, if the new disc version has an additional parameter that is not included in the existing disc version, the number of bytes may vary. Referring to FIG. 3A, since the parameter $Temp$ is added to the recording pattern, in a new disc version, disc- and recording-related information is recorded in 11- 21 bytes. As described above, in the new disc, disc- and recording-related information is recorded in the same format as for the existing disc- and

recording-related information. However, the number of bytes used for recording the new disc- and recording-related information may be different from the number of bytes used for recording the existing disc- and recording-related information. Such a case is when the parameters related to the recording pattern are changed.

5 Furthermore, an updated recording pattern may include an existing recording pattern. In other words, a new recording pattern includes the existing recording pattern parameters Ttop, Tmp, and Tcl, and additionally the parameter Temp.

In the meantime, the disc version may not be changed while the recording speed may vary. For example, when the disc version is the version 2.0 while the recording speed is changed from 5m/s to 3m/s, since the disc version is not changed, disc-related information is not revised while recording-related information is revised. Like this, if the disc-related information is not revised, it is preferable that the disc-related information is not recorded again while only revised recording-related information is recorded. As shown in FIG. 3A, in 22 – 28 bytes, recording-related information revised due to a variation in the recording speed is recorded. Also, user data is recorded by using the disc-related information recorded in 11 - 14 bytes and the recording-related information recorded in 22 - 28 bytes.

FIG. 4 is a flowchart explaining a process of recording and/or reproducing user data on and/or from the information storage medium according to the present invention. The process will be described with reference to FIG. 3A. First, in step S10, a disc is loaded in a drive. Here, if the drive is an existing drive, disc-related data in 0 – 9 bytes are reproduced while if the drive is a new drive, disc- and recording-related data in 11 – 21 or 22 – 28 bytes corresponding to the new version of drive are reproduced. Thus, the number of bytes of reproduced data is determined by the drive version. For example, in FIG. 3A, the number of bytes of data to be reproduced can be checked by reproducing data recorded in the fourth byte.

When data is recorded/reproduced by the existing drive, in step S15, data corresponding to the existing drive, i.e., data recorded in 0 – 9 bytes, is reproduced. In step S20, user data is recorded/reproduced by using this data. Alternatively, in case where data is recorded/reproduced in the new drive, in step S25, data corresponding to the new drive, i.e., data recorded in 11 - 21 bytes, is reproduced. In step S30, user data is recorded/reproduced by using this data. In particular, when data is recorded/reproduced by the new drive in a disc, the version of which is

not changed and the recording speed of which is changed, it is preferable that user data is recorded/reproduced by using disc-related information recorded in 11 - 14 bytes and recording-related information recorded in the 22 - 28 bytes.

Next, a method of recording/reproducing information on/from the information storage medium according to the present invention will be described.

First, existing disc- and recording-related information is recorded. Next, disc- and/or recording-related information updated according to a change in one of the disc version number and the recording speed is recorded in an area in which existing disc- and recording-related information is recorded. Here, the area in which disc- and recording-related information is recorded may be the disc control data zone 10-5 shown in FIG. 1.

Also, updated disc- and recording-related information is successively recorded after the bytes in which existing disc- and recording-related information is recorded. Here, it is preferable that updated disc- and recording-related information is recorded in the same format as an existing recording format by which the existing disc- and recording-related information is recorded so as to be consistent with the existing recording format.

In the present invention, disc- and recording-related information may be reproduced by a push-pull signal channel or a sum channel. Information reproduced by the push-pull signal channel may be information recorded in a groove wobble and information reproduced by the sum channel may be information recorded in a recordable area of at least one of the lead-in area 10 and the lead-out area. Information reproduced by the sum channel may be information recorded in the same format as a mark recorded in the user data area 15.

[Effect of the Invention]

As described above, in the information storage medium and the recording/reproducing method therefor, when the disc version and the recording speed vary, updated disc- and recording-related information is recorded with existing disc- and recording-related information on the existing disc version and recording speed. Thus, data can be recorded/reproduced on/from a new version of information storage medium even using an existing drive. Also, updated disc- and recording-related information can be recorded in the same format as an existing format by which existing disc- and recording-related information is recorded so as to be consistent with the existing format.

What is claimed is:

1. An information storage medium comprising an area in which disc- and recording-related information updated with a change in at least one of a disc version number and a recording speed is recorded along with existing disc- and recording-related information.

2. The information storage medium of claim 1, wherein the disc- and recording-related information updated with a change in at least one of the disc version number and the recording speed is recorded in the same format as existing disc- and recording-related information.

3. The information storage medium of claim 2, wherein the updated disc- and recording-related information is successively recorded right after the existing disc- and recording-related information.

4. The information storage medium of claim 2, wherein a portion of the updated disc- and recording-related information is recorded in the same format as the existing disc- and recording-related information while the number of bytes required for recording the portion of the updated disc- and recording-related information are different from the existing disc- and recording-related information.

5. The information storage medium of any one of claims 1 through 4, wherein the disc-related information comprises one parameter of a kind of disc, a disc size, a disc structure, a version number, user area information, manufacturer information, and the recording-related information comprises one parameter of a recording speed, a recording power, a reproduction power, and a recording pattern.

6. The information storage medium of claim 5, wherein data recorded in a byte number different from existing information is a parameter related to a new recording pattern.

7. The information storage medium of claim 6, wherein the new recording pattern comprises parameters of an existing recording pattern.

8. The information storage medium of any one of claims 1 through 4, wherein the disc- and recording-related information is recorded by one of a push-pull signal channel and a sum channel.

5 9. The information storage medium of claim 8, wherein information reproduced by the push-pull signal channel is recorded in a groove wobble format.

10 10. The information storage medium of claim 8, wherein information reproduced by the sum channel is information recorded in a recordable area of at least one of a lead-in area and a lead-out area.

15 11. The information storage medium of any one of claims 1 through 4, wherein the disc- and recording-related information is recorded in a groove wobble format and in a recordable area of at least one of the lead-in area and the lead-out area, and a portion of the disc- and recording-related information recorded in the groove wobble format is different from a portion of the disc- and recording-related information recorded in the recordable area.

20 12. The information storage medium of claim 11, wherein the different portions of the disc- and recording-related information is information related to a user data area.

25 13. A method of recording/reproducing information on/from an information storage medium, the method comprising:

recording existing disc- and recording-related information; and
recording disc- and recording-related information updated with a change in at least one of a disc version number and a recording speed in an area in which the existing disc- and recording-related information is recorded.

30 14. The method of claim 13, wherein the updated disc- and recording-related information is recorded in the same format as a format by which the existing disc- and recording-related information is recorded.

15. The method of claim 14, wherein the updated disc- and recording-related information is successively recorded right after the existing disc- and recording-related information.

5 16. The method of claim 15, wherein a portion of the updated disc- and recording-related information is recorded in the same format as the existing disc- and recording-related information while the number of bytes required for recording the portion of the updated disc- and recording-related information are different from the existing disc- and recording-related information.

10 17. The method of any one of claims 13 through 16, wherein the disc-related information comprises one of a kind of disc, a disc size, a disc structure, a version number, user area information, manufacturer information, and the recording-related information comprises one of a recording speed, a recording power,
15 a reproduction power, and a recording pattern.

18. The method of claim 17, wherein data recorded in a byte number different from existing information is a parameter related to a new recording pattern.

20 19. The method of claim 18, wherein the new recording pattern comprises parameters of an existing recording pattern.

25 20. The method of any one of claims 13 through 16, wherein the disc- and recording-related information is recorded by one of a push-pull signal channel and a sum channel.

21. The method of claim 20, wherein information reproduced via the push-pull signal channel is recorded in a groove wobble format.

30 22. The method of claim 20, wherein information reproduced by the sum channel is information recorded in a recordable area of at least one of a lead-in area and a lead-out area.

23. The method of any one of claims 13 through 16, wherein the disc- and recording-related information is recorded in a groove wobble format and in a recordable area of at least one of the lead-in area and the lead-out area, and a portion of the disc- and recording-related information recorded in the groove wobble format is different from a portion of the disc- and recording-related information recorded in the recordable area.

24. The method of claim 23, wherein the different portions of the disc- and recording-related information are information related to a user data area.

FIG. 1

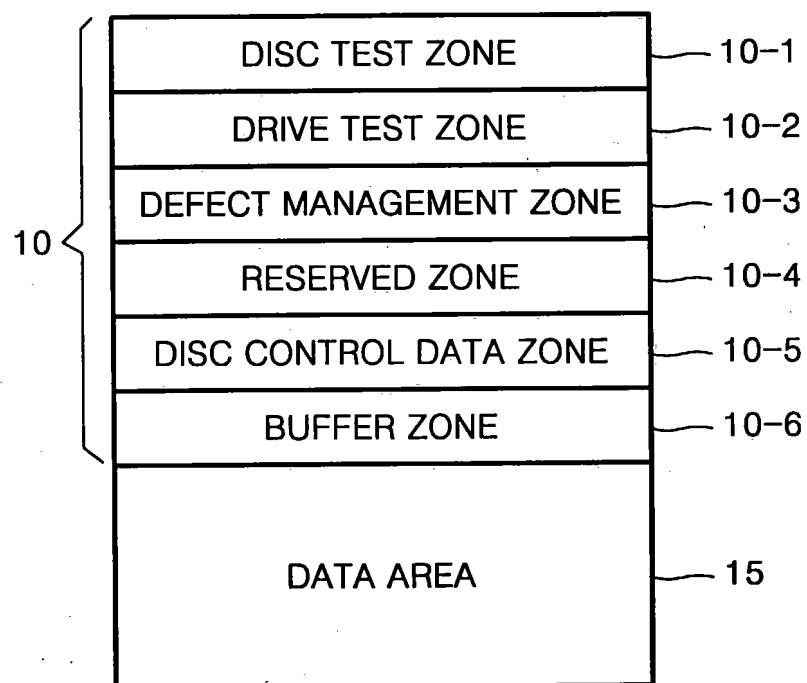


FIG. 2A

BYTE NO	CONTENTS	NUMBER OF BYTE
0	KIND OF DISC AND DISC VERSION NUMBER(DVD, Ver1.0)	1
1	DISC SIZE(120mm)	1
2	DISC STRUCTURE(SINGLE LAYER)	1
3	MANUFACTURER INFORMATION(SAMSUNG)	1
4	THE NUMBER OF BYTES USED FOR RECORDING INFORMATION	1
5	RECORDING SPEED	1
6	REPRODUCTION POWER	1
7	Ttop	1
8	Tmp	1
9	Tcl	1
10 TO M	RESERVED	M-9

FIG. 2B

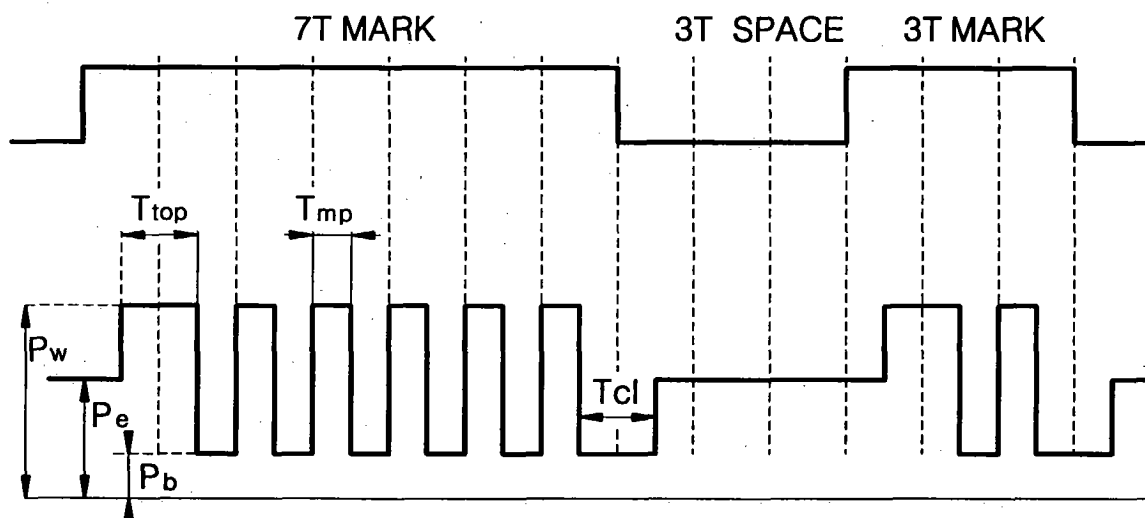


FIG. 3A

BYTE NO	CONTENTS	NUMBER OF BYTE
0	KIND OF DISC AND DISC VERSION NUMBER(DVD, Ver1.0)	1
1	DISC SIZE(120mm)	1
2	DISC STRUCTURE(SINGLE LAYER)	1
3	MANUFACTURER INFORMATION(SAMSUNG)	1
4	NUMBER OF BYTES USED FOR RECORDING INFORMATION	1
5	RECORDING SPEED(1.0m/s)	1
6	REPRODUCTION POWER	1
7	Ttop(T1)	1
8	Tmp(T2)	1
9	Tcl(T3)	1
10	RESERVED	1
11	KIND OF DISC AND DISC VERSION NUMBER(DVD, Ver1.0)	1
12	DISC SIZE(120mm)	1
13	DISC STRUCTURE(SINGLE LAYER)	1
14	MANUFACTURER INFORMATION(SAMSUNG)	1
15	NUMBER OF BYTES USED FOR RECORDING INFORMATION	1
16	RECORDING SPEED(5m/s)	1
17	REPRODUCTION POWER	1
18	Ttop(T1)	1
19	Tmp(T2)	1
20	Tcl(T3)	1
21	Temp(T4)	1
22	NUMBER OF BYTES USED FOR RECORDING INFORMATION	1
23	RECORDING SPEED(3m/s)	1
24	REPRODUCTION POWER	1
25	Ttop(T1)	1
26	Tmp(T2)	1
27	Tcl(T3)	1
28	Temp(T4)	1
29 TO M	RESERVED	M - 28

FIG. 3B

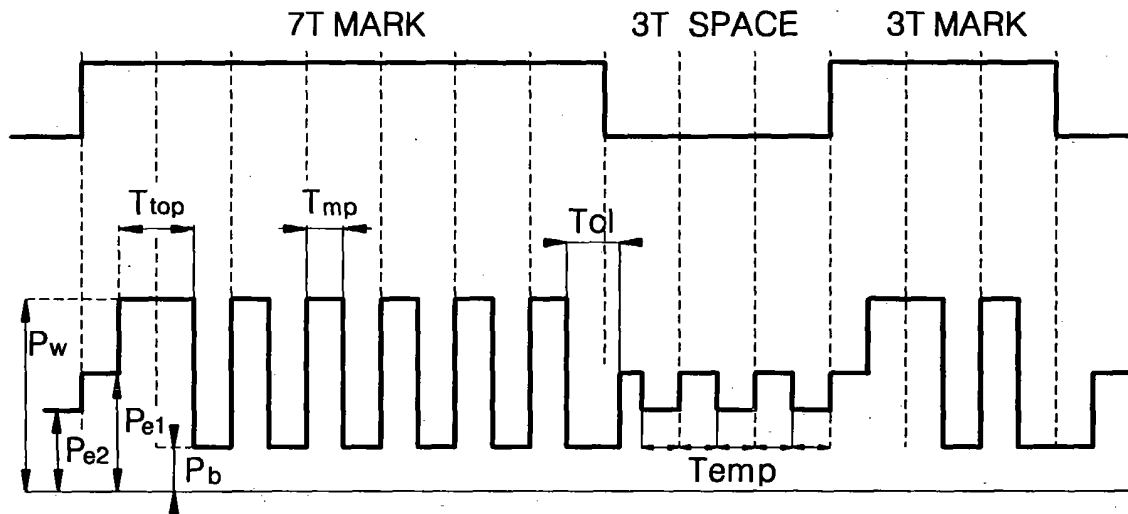


FIG. 4

